

## CLAIMS

What is claimed is:

1           1.     A power generation system, comprising:  
2           a fuel source to provide fuel;  
3           a turbogenerator, coupled to the fuel source, to generate AC power;  
4           a power controller, coupled to the turbogenerator, including an AC/DC  
5 power converter, said AC/DC power converter to convert said AC power generated  
6 by the turbogenerator to DC power on output lines to supply a DC load, said power  
7 controller to regulate the fuel to the turbogenerator, independent of a DC voltage on  
8 the output lines; and  
9           a capacitor coupled across the output lines, said capacitor to source power to  
10 and/or sink power from the output lines, due to load changes by the DC load, to  
11 stabilize a DC voltage on the output lines.

1           2.     The power generation system of claim 1 wherein the capacitor  
2 comprises at least one of the following: an electrochemical capacitor and a hybrid  
3 capacitor.

1           3.     The power generation system of claim 2 wherein a voltage range of the  
2 capacitor is limited to a predetermined voltage range.

1           4.     The power generation system of claim 1 wherein the capacitor is  
2     located internal to the power controller.

1           5.     The power generation system of claim 1 wherein when an increase in  
2     the load is detected, the power controller increases the fuel to the turbogenerator to  
3     increase the DC power on the output lines.

1           6.     The power generation system of claim 5 wherein when the DC power  
2     on the output lines is sufficient to match the increase in the load and recharge the  
3     capacitor, said power controller to reduce the fuel to the turbogenerator to match the  
4     load required by the DC load.

1           7.     The power generation system of claim 1 wherein when a decrease in  
2     the load is detected, the power controller decreases the fuel to the turbogenerator to  
3     decrease the DC power on the output lines to match the load required by the DC  
4     load.

1           8.     The power generation system of claim 1 wherein the turbogenerator  
2     includes a motor/generator and said AC/DC power converter comprises a bi-  
3     directional AC/DC power converter, said power controller, in a startup mode, to  
4     configure the bi-directional AC/DC power converter in a reverse direction to  
5     convert DC power of the capacitor to AC power to power the motor/generator.

1           9.     The power generation system of claim 1 further comprising a battery  
2     controllably coupled across the output lines, under control of the power controller,  
3     to charge the capacitor.

1           10.    The power generation system of claim 1 wherein the turbogenerator  
2     comprises:

3           a shaft;

4           a generator, coupled to the shaft, to generate the AC power;

5           a compressor, coupled to the shaft, to provide a supply of compressed air;

6           a combustor coupled to receive the supply of compressed air and the fuel,  
7     said combustor to combust the fuel and to provide exhaust gas;

8           a turbine coupled the shaft and coupled to receive the exhaust gas, said  
9     exhaust gas to flow through the turbine to control a rotational speed of the shaft;

10          and

11          a recuperator including a high pressure side coupled between the compressor  
12     and the combustor, and a low pressure side coupled to receive the exhaust gas from  
13     the turbine.

1           11.    The power generation system of claim 10 further comprising a  
2     temperature sensor coupled to the power controller and the turbine to sense a  
3     temperature, said power controller to vary the supply of fuel to the combustor to  
4     control the temperature, said control of the temperature being independent of the  
5     DC voltage on the output lines.

1           12.    A power generation system, comprising:  
2           a fuel source to provide fuel;  
3           a turbogenerator, coupled to the fuel source, to generate AC power;  
4           a power controller, coupled to the turbogenerator, including an AC/DC  
5 power converter and a DC/DC power converter, said AC/DC power converter to  
6 convert said AC power generated by the turbogenerator to DC power on a DC bus,  
7 said DC/DC power converter to convert the DC power on the DC bus to an output  
8 DC power on output lines to supply a DC load, said power controller to regulate the  
9 fuel to the turbogenerator, independent of a DC voltage on the DC bus; and  
10          a capacitor coupled across the output lines, said capacitor to source power to  
11 and/or sink power from the output lines, due to load changes by the DC load.

1           13.    The power generation system of claim 12 wherein the capacitor  
2 comprises at least one of the following: an electrochemical capacitor and a hybrid  
3 capacitor.

1           14.    The power generation system of claim 12 wherein a voltage range of  
2 the capacitor is limited to a predetermined voltage range.

1           15.    The power generation system of claim 12 wherein the capacitor is  
2 located internal to the power controller.

1           16.    The power generation system of claim 12 wherein when an increase in  
2   the load is detected, the power controller increases the fuel to the turbogenerator to  
3   increase the output DC power on the output lines.

1           17.    The power generation system of claim 16 wherein when the output DC  
2   power on the output lines is sufficient to match the increase in the load and recharge  
3   the capacitor, said power controller to reduce the fuel to the turbogenerator to match  
4   the load required by the DC load.

1           18.    The power generation system of claim 12 wherein when a decrease in  
2   the load is detected, the power controller decreases the fuel to the turbogenerator to  
3   decrease the output DC power on the output lines to match the load required by the  
4   DC load.

1           19.    The power generation system of claim 12 wherein the turbogenerator  
2   includes a motor/generator and said AC/DC power converter and said DC/DC  
3   power converter comprise a bi-directional AC/DC power converter and a bi-  
4   directional DC/DC power converter, respectively, said power controller, in a  
5   startup mode, to configure the bi-directional AC/DC power converter and the bi-  
6   directional DC/DC power converter in a reverse direction to convert DC power of  
7   the capacitor to AC power to power the motor/generator.

1           20.    The power generation system of claim 12 further comprising a battery  
2   controllably coupled across the output lines, under control of the power controller,  
3   to charge the capacitor.

1           21.    The power generation system of claim 12 wherein the turbogenerator  
2   comprises:  
3        a shaft;  
4        a generator, coupled to the shaft, to generate the AC power;  
5        a compressor, coupled to the shaft, to provide a supply of compressed air;  
6        a combustor coupled to receive the supply of compressed air and the fuel,  
7   said combustor to combust the fuel and to provide exhaust gas;  
8        a turbine coupled the shaft and coupled to receive the exhaust gas, said  
9   exhaust gas to flow through the turbine to control a rotational speed of the shaft;  
10   and  
11       a recuperator including a high pressure side coupled between the compressor  
12   and the combustor, and a low pressure side coupled to receive the exhaust gas from  
13   the turbine.

1           22.    The power generation system of claim 21 further comprising a  
2   temperature sensor coupled to the power controller and the turbine to sense a  
3   temperature, said power controller to vary the supply of fuel to the combustor to  
4   control the temperature, said control of the temperature being independent of the  
5   DC voltage on the DC bus.

1        23.    A power generation system, comprising:  
2        a fuel source to provide fuel;  
3        a turbogenerator, coupled to the fuel source, to generate AC power;  
4        a power controller, coupled to the turbogenerator, including an AC/DC  
5        power converter and a first DC/DC power converter, said AC/DC power converter  
6        to convert said AC power generated by the turbogenerator to DC power on a DC  
7        bus, said first DC/DC power converter to convert the DC power on the DC bus to  
8        an output DC power on output lines to supply a DC load, said power controller to  
9        regulate the fuel to the turbogenerator, independent of a DC voltage on the DC bus;  
10       and  
11       a capacitor controllably coupled, under control of the power controller, across  
12       the DC bus via a second DC/DC power converter to source power to and/or sink  
13       power from the DC bus, due to load changes by the DC load.

1        24.    The power generation system of claim 23 wherein the capacitor  
2        comprises at least one of the following: an electrochemical capacitor and a hybrid  
3        capacitor.

1        25.    The power generation system of claim 23 wherein the second DC/DC  
2        power converter steps up a terminal voltage of the capacitor to match the DC  
3        voltage on the DC bus.

1           26.    The power generation system of claim 23 wherein at least one of the  
2    capacitor and the second DC/DC power converter is located internal to the power  
3    controller.

1           27.    The power generation system of claim 23 wherein when an increase in  
2    the load is detected, the power controller increases the fuel to the turbogenerator to  
3    increase the DC power on the DC bus.

1           28.    The power generation system of claim 27 wherein when the DC power  
2    on the DC bus is sufficient to match the increase in the load and recharge the  
3    capacitor, said power controller to reduce the fuel to the turbogenerator to match the  
4    load required by the DC load.

1           29.    The power generation system of claim 23 wherein when a decrease in  
2    the load is detected, the power controller decreases the fuel to the turbogenerator to  
3    decrease the DC power on the DC bus to match the load required by the DC load.

1           30.    The power generation system of claim 23 wherein the turbogenerator  
2    includes a motor/generator and said AC/DC power converter is bi-directional, said  
3    power controller, in a startup mode, to configure the AC/DC power converter in a  
4    reverse direction and the second DC/DC power converter in a forward direction to  
5    convert DC power of the capacitor to AC power to power the motor/generator.



1           31.    The power generation system of claim 23 further comprising a battery  
2   controllably coupled across the capacitor, under control of the power controller, to  
3   charge the capacitor.

1           32.    The power generation system of claim 23 wherein the turbogenerator  
2   comprises:  
3           a shaft;  
4           a generator, coupled to the shaft, to generate the AC power;  
5           a compressor, coupled to the shaft, to provide a supply of compressed air;  
6           a combustor coupled to receive the supply of compressed air and the fuel,  
7   said combustor to combust the fuel and to provide exhaust gas;  
8           a turbine coupled the shaft and coupled to receive the exhaust gas, said  
9   exhaust gas to flow through the turbine to control a rotational speed of the shaft;  
10   and  
11           a recuperator including a high pressure side coupled between the compressor  
12   and the combustor, and a low pressure side coupled to receive the exhaust gas from  
13   the turbine.

1           33.    The power generation system of claim 32 further comprising a  
2   temperature sensor coupled to the power controller and the turbine to sense a  
3   temperature, said power controller to vary the supply of fuel to the combustor to  
4   control the temperature, said control of the temperature being independent of the  
5   DC voltage on the DC bus.

1           34.    A power generation system, comprising:  
2           a turbogenerator including a motor/generator and a turbine, said  
3           turbogenerator to generate AC power; and  
4           a power controller, coupled to the turbogenerator, including an AC/DC  
5           power converter and a capacitor, said AC/DC power converter to convert said AC  
6           power generated by the turbogenerator to DC power on output lines to supply a DC  
7           load, said capacitor coupled across the output lines to source power to and/or sink  
8           power from the output lines due to load changes, said power controller to regulate a  
9           speed of the turbine, independent of a DC voltage on the output lines.

1           35.    The power generation system of claim 34 wherein the capacitor is at  
2           least one of an electrochemical capacitor and a hybrid capacitor.

1           36.    The power generation system of claim 34 wherein the AC/DC power  
2           converter comprises a bi-directional AC/DC power converter, said power  
3           controller, in a startup mode, to configure the bi-directional AC/DC power  
4           converter in a reverse direction to convert DC power of the capacitor to AC power  
5           to power the motor/generator.

1           37.    The power generation system of claim 34 further comprising a battery  
2           controllably coupled across the output lines, under control of the power controller,  
3           to charge the capacitor.

1        38.    A power generation system, comprising:  
2        a turbogenerator including a motor/generator and a turbine, said  
3        turbogenerator to generate AC power; and  
4        a power controller, coupled to the turbogenerator, including an AC/DC  
5        power converter, a DC/DC power converter, and a capacitor, said AC/DC power  
6        converter to convert said AC power generated by the turbogenerator to DC power  
7        on a DC bus, said DC/DC power converter to convert the DC power on the DC bus  
8        to an output DC power on output lines to supply a DC load, said capacitor coupled  
9        across the output lines to source power to and/or sink power from the output lines,  
10       due to load changes by the DC load, said power controller to regulate a speed of the  
11       turbine, independent of a DC voltage on the DC bus.

1        39.    The power generation system of claim 38 wherein the capacitor  
2        comprises at least one of the following: an electrochemical capacitor and a hybrid  
3        capacitor.

1        40.    The power generation system of claim 38 wherein the AC/DC power  
2        converter and said DC/DC power converter comprise a bi-directional AC/DC  
3        power converter and a bi-directional DC/DC power converter, respectively, said  
4        power controller, in a startup mode, to configure the bi-directional AC/DC power  
5        converter and the bi-directional DC/DC power converter in a reverse direction to  
6        pass energy stored by the capacitor to start the motor/generator.

1           41.    The power generation system of claim 38 further comprising a battery  
2   controllably coupled across the output lines, under control of the power controller,  
3   to charge the capacitor.

1           42.    A power generation system, comprising:  
2           a turbogenerator including a motor/generator and a turbine, said  
3   turbogenerator to generate AC power; and  
4           a power controller, coupled to the turbogenerator, including an AC/DC  
5   power converter, first and second DC/DC power converters, and a capacitor, said  
6   AC/DC power converter to convert said AC power generated by the turbogenerator  
7   to DC power on a DC bus, said first DC/DC power converter to convert the DC  
8   power on the DC bus to an output DC power on output lines to supply a DC load,  
9   said capacitor controllably coupled across the DC bus via the second DC/DC power  
10   converter, under control of the power controller, to source power to and/or sink  
11   power from the DC bus due to load changes by the DC load, said power controller  
12   to regulate a speed of the turbine, independent of a DC voltage on the DC bus.

1           43.    The power generation system of claim 42 wherein the capacitor  
2   comprises at least one of the following: an electrochemical capacitor and a hybrid  
3   capacitor.

1           44.    The power generation system of claim 42 wherein the AC/DC power  
2   converter is bi-directional, said power controller, in a startup mode, to configure the  
3   AC/DC power converter in a reverse direction and the second DC/DC power

- 4 converter in a forward direction to pass energy stored by the capacitor to power the
- 5 motor/generator.